REMARKS

For clarification, Applicant notes that the listing of references acknowledged by the Examiner on July 6, 2008 was intended for a different application (10/787695 having Attorney Docket No. 2003P14533US) and not for the present application.

In the Office Action, the Examiner rejected claim 1 pursuant to 35 U.S.C. §112, second paragraph. The Examiner's suggested change has been made to claim 1.

Claims 1, 2, 6, 16, 20, and 21 were rejected pursuant to 35 U.S.C. §102(b) as anticipated by Leavitt, et al. (U.S. Patent No. 6,491,634). Claims 3, 5, 7, 17, and 19 were rejected pursuant to 35 U.S.C. § 103(a) as unpatentable over Leavitt, et al. in view of Savord (U.S. Patent No. 6,013,032). Claims 4 and 18 were rejected pursuant to 35 U.S.C. §103(a) as unpatentable over Leavitt, et al. in view of Fillhart, et al. (U.S. Statutory Invention Registration No. H1171). Claims 9-13, 15, and 22-25 were rejected pursuant to 35 U.S.C. §103(a) as unpatentable over Savord in view of Leavitt, et al. or Swayze, et al. (U.S. Published Application No. 2002/0081871).

Applicant respectfully requests reconsideration of the rejections of claims 1-7, 9-12 and 14-24, including independent claims 1, 9, 16 and 22.

Independent claim 1 recites processing signals from M elements to a lesser N of processed signals and converting the processed signals within a transducer assembly. Leavitt, et al. do not disclose this limitation. Leavitt, et al. convert analog signals to digital signals for each element (col. 4, lines 22-30). The converted digital signals are then combined using sub-beamforming (col. 4, lines 38-43 and 59-65). A shown in Figure 2, the conversion by the ADCs 214 occurs before the processing to reduce the number of signals. Leavitt, et al. do not process signals to a lesser number of processed signals and convert the processed signals.

Independent claim 1 recites a connector releasably connectable with the ultrasound system. Leavitt, et al. do not disclose this limitation. Leavitt, et al. provide an interface cable 104 connected with the portable processor and the probe assembly (col. 3, lines 31-33). The cable 104 has a connection 222 with the probe assembly (col. 4, lines 45, 61, and 64-65) and a connection 254 with the portable processor (col. 5, lines 39-48). Given the portable

system with electronics in the probe assembly, the system may have been fixed or effectively a one-piece construction. Regardless, the connections are not described as releasable.

Independent claim 16 recites converting partially beamformed signals, so is allowable for the same reason as claim 1.

Dependent claims 2-7, and 17-21 depend from independent claims 1 and 16, so are allowable for the respective reasons. Further limitations patentably distinguish from the cited references.

Claim 4 recites partially beamforming demultiplexed signals. Fillhart provides multiplexing and demultiplexing to allow for remote beamforming (abstract). However, Leavitt, et al. positions the beamformer at the transducer, which is not remote. A person of ordinary skill in the art would not have provided the demultiplexing of Fillhart with the partial beamforming of Leavitt, et al.

Claim 5 recites converting digital signals to analog signals in the transducer assembly. Savord and Leavitt, et al. do not provide digital-to-analog converters. The Examiner alleges a desire to convert to analog for use with an old system in view of Leavitt, et al., but this is hindsight reasoning. Leavitt, et al. show a lap top for operation with the transducer. A person of ordinary skill in the art would not have converted to analog from digital. Leavitt, et al. mention possible analog circuits instead of digital, so would have used analog subarray processing, not provided a digital-to-analog converter, to operate with an analog imager.

Claim 6 recites that the converting is mixing. Leavitt, et al. convert from analog to digital, but do not mix signals.

Claim 7 recites processing in the transducer probe housing and converting within a connector housing releasable from the ultrasound system, a cable connecting the transducer probe housing with the connector housing. The Examiner relies on Leavitt, et al. in view of Savord for this limitation. Leavitt, et al. discloses placement in the transducer probe housing or the portable imaging system. Leavitt, et al. do not even show or discuss a connector housing. Savord positions the subarray beamformers in the transducer handle 102 to reduce the cable count (col. 5, lines 45-52). A phase shift network for combining the two outputs representing each subarray is positioned in the connector housing (col. 3, lines 11-15). The existence of the phase shift network in the connector housing does not teach conversion in

the connector housing. A person of ordinary skill in the art would not have positioned the conversion in the connector housing. Claim 19 is allowable for similar reasons.

Claim 17 recites sub-array mixing. Savord subarray beamforms. The subarray beamforming uses amplifiers, a summing node, a phase shifter, and a summing unit (see Figure 5). Sub-array mixing is not disclosed.

Claim 18 is allowable for the same reasons as claim 4. Further, claim 18 recites demultiplexing in the connector housing. Leavitt, et al. and Fillhart do not disclose this limitation.

Claim 21 recites partially beamforming for at least two simultaneously received beams. Leavitt, et al. partially beamform for different subarrays. The subarray signals are not simultaneously received beams. Leavitt, et al. combine the subarray information to form a single beam. Simultaneous receive beams are not disclosed.

Independent claim 9 has been amended with the limitations of dependent claim 13. Claim 9 recites a connector housing with a partial beamformer. Savord does not disclose these limitations. Savord positions the subarray beamformers in the transducer handle 102 to reduce the cable count (col. 5, lines 45-52). A phase shift network for combining the two outputs representing each subarray is positioned in the connector housing (col. 3, lines 11-15). The signals sent from the subarray processors of Savord have already been beamformed. The phase shift network processes the output of the subarray beamforming (abstract). Savord do not provide the partial beamforming in the connector housing.

Independent claim 22 has been amended with the limitations of claim 25. Claim 22 recites digital-to-analog converting of the signals or mixing the signals within the detachable connector. Savord does not provide mixing. Savord provides analog-to-digital conversion in the imaging system (see Figure 2). Leavitt, et al. provides the analog-to-digital conversion in the transducer housing. Leavitt, et al. does not show mixing. Both Leavitt, et al. and Savord fail to disclose mixing. Both Leavitt, et al. and Savord fail to disclose analog-to-digital conversion in the connector housing. Swayze does not disclose these limitations either.

Dependent claims 10-12, 14-15, and 23-24 depend from one of the independent claims discussed above, so are allowable for the same reasons. Further limitations distinguish from the cited references.

Claim 11 recites the signal processing device comprising a digital-to-analog converter where the signal processing device is in the connector housing. Savord, Leavitt, and Swayze do not provide digital-to-analog converters. The Examiner alleges a desire to convert to analog for use with an old system in view of Leavitt, et al., but this is hindsight reasoning. Leavitt, et al. show a lap top for operation with the transducer. A person of ordinary skill in the art would not have converted to analog from digital. Leavitt, et al. mention possible analog circuits instead of digital, so would have used analog subarray processing, not provided a digital-to-analog converter.

Claim 12 recites a mixer. The three cited references do not show a mixer.

Claim 14 recites a demultiplexer. Fillhart provides multiplexing and demultiplexing to allow for remote beamforming (abstract). However, Savord positions the beamformer at the transducer, which is not remote. A person of ordinary skill in the art would not have provided the demultiplexing of Fillhart with the partial beamforming of Savord.

Claims 15 and 23 are allowable for similar reasons as claim 22.

CONCLUSION

Applicant respectfully submits that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Craig Summerfield at (312) 321-4726.

PLEASE MAIL CORRESPONDENCE TO:

Siemens Corporation
Customer No. 28524
Attn: Elsa Keller, Legal Administrator
170 Wood Avenue South
Iselin, NJ 08830

Respectfully submitted,

Rosa S. Kim, Reg. No. 39,728
Attorney(s) for Applicant(s)
Telephone: 650-694-5330
Date: 10-9-08